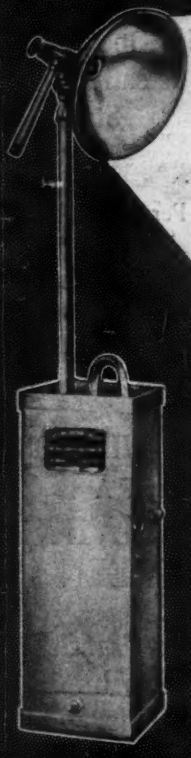
Pit and Quarry

SAND ▪ GRAVEL ▪ STONE

HANDLING ▪ CRUSHING ▪ SCREENING ▪ WASHING

LIBRARY



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Send TODAY for Catalogue 216

The Alexander Milburn Co.

Baltimore, Maryland

Offices or Agents in All Principal Cities

NOVEMBER, 1917

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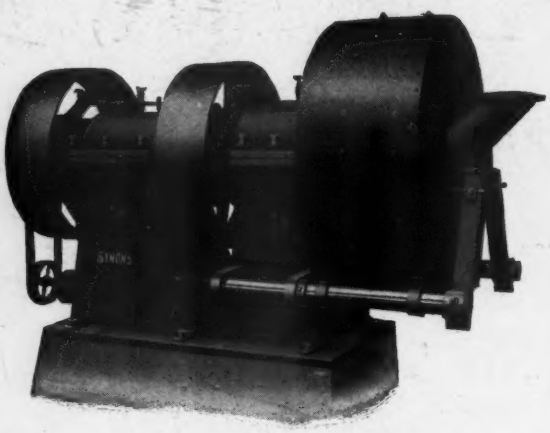
Symons Disc Crusher



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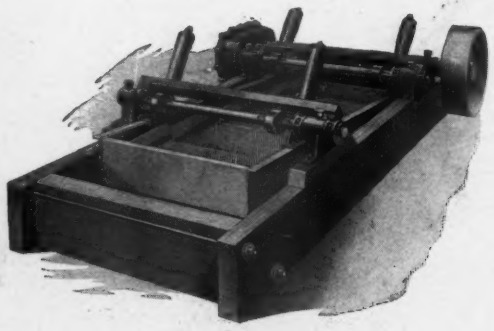
Large Capacity Uniform Size.

In Operation in Nearly Every State

BUILT IN FOLLOWING SIZES.

Size	18 inches	Capacity	5 to 15	Tons	Per	Hour
"	24 "	"	12 to 30	"	"	"
"	36 "	"	25 to 65	"	"	"
"	48 "	"	45 to 120	"	"	"

Simons Pulsating Screens



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Larger Capacity
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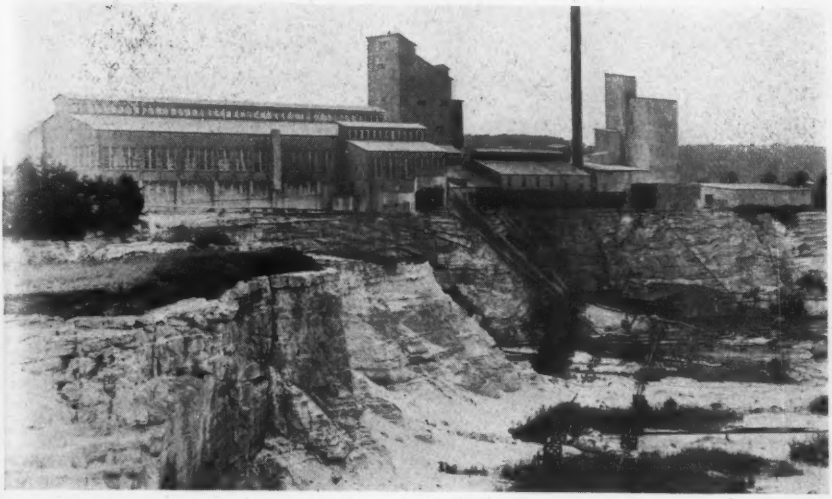
Chicago Heights, Illinois

Pit and Quarry

Vol. 2 NOVEMBER, 1917 No. 1



PLANT A OF THE OTTAWA SILICA COMPANY, OTTAWA, ILL.—TALL BUILDING AT THE RIGHT CONTAINS THE PULVERIZING DEPARTMENT.

New Silica Plant Has Big Capacity

Operating Method Is Duplicate of Older Ottawa Mill—Paint and Enamel Industry Uses Output of Pulverizing Department.

DESPITE THE SERIOUS SHORTAGE of railway cars, the Ottawa Silica Company, Ottawa, Ill., is operating its new plant (Mill B), big storage bins serving as sand receptacles when cars cannot be had. Only about 50 per cent of the total number of cars required is being received by the company and oftentimes the drain bins, dryers and elevators are the only departments kept going. The new plant was completed in September at a cost of $150,000 and has a capacity of 850 tons daily. The old plant averages 1,100 tons. Both plants are equipped with all of the latest devices of handling sand, including elevators, separators, washers and dryers. Much of the new plant is built of reinforced concrete. It is located about 75 yards south of the old plant and the pits of both are connected by a tunnel 60 feet below the surface through which pipes are carried.

The quarry face is 60 feet deep and the material is blasted down each day, three holes being the average shot. It is 99.82 per cent pure silica, and after being shot down is easily handled by the hydraulic method. The sand is

NEW PLANT OF THE OTTAWA SILICA COMPANY UNDER CONSTRUCTION. VIEW SHOWS ONLY THE STORAGE AND ELEVATOR BUILDING. THE STRUCTURE COVERING THE DRAIN BINS AND DRYERS HAS SINCE BEEN ERECTED ON THE CONCRETE FOUNDATIONS MADE BY THE FORMS SHOWN AT THE RIGHT.

washed down to Nye 5-inch pumps, which handle on an average of 90 per cent sand and 10 per cent water. Hydraulic recovery pipes are extended from the plant to the quarry in such number as required, there being three at the present time. The mixture of sand and water passes through the screen at each pump stationed at the quarry face and two men with shovels lift the hard lumps away from the screens. These rocks are later shattered and recovered as sand. The pumps are centrifugal and work under a 90-pound water pressure and 80 pounds of steam, water and steam condensing to form a vacuum.

At the quarry end of each recovery pipe there is a receiving station into which as many leads direct from the quarry face may empty as is desired. This is a wooden box usually 12 feet square and 5 feet deep and near it is a booster pump for sending the material on to the plant.

Material Elevated in Wooden Trough

At the plant the material is discharged into a receiving hopper on the floor of the pit and at the foot of an inclined elevator, running in a trough, leading to the plant above. This elevator is an 18-inch belt, 85 feet long on centers, carrying paddles underneath it which fit into the wooden trough, so that the bottom of the trough, instead of the belt, supports the weight of the material as it goes up.

At the top of the inclined elevator it is deposited into a hopper which feeds to four washing bins, and from these washing bins to drain bins by pumps. The drain bins are of concrete and steel, having walls 12 inches thick at the top and 22 inches at the bottom. They are 17 feet deep and 25 feet square, having concrete floors. The sand is transferred from the drain bins to the dryers by means of a 5-ton Pawling & Harnischfeger 5-ton traveling overhead crane carrying a Blaw 2½-yard clamshell bucket.

How Sand Is Dried

There are three dryers each 7 feet wide, 20 feet long and 14 coils deep. These were constructed on the job of 2-inch pipes. The drying bin is alongside the two drain bins and under it is a 16-inch Diamond rubber conveyor belt 90 feet long on centers traveling on Stephens-Adamson rollers which takes the dried material to a vertical cup elevator, which in turn delivers it to screens.

Where the sand is thrown from the conveyor belt to the hopper at the

(Continued on page 49)

Pumping Methods on Big Sand Dredge

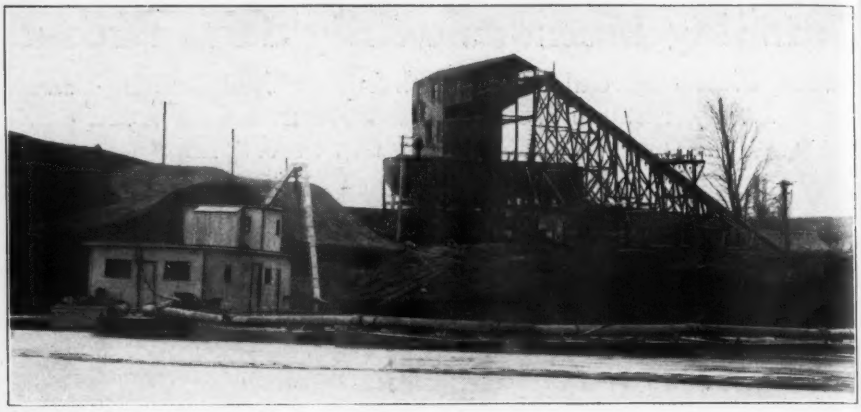
Seven Thousand Gallons, with Ten Per Cent Solids, Taken Every Minute from River Bottom and Forced Through Feed Pipe to Top of Washing and Screening Plant

ABOUT SEVENTY-FIVE ACRES containing from 9 to 10 million yards are owned by the Chagrin Sand and Gravel Co., Aurora, Ohio, and there are some 15 million yards on land adjacent. The material is a glacial deposit, lying in a northeast and southwest direction, considerably cut up by the Chagrin river and its small tributaries. The outstanding features of this plant are horizontal screens, compactness of washing plant, gravity operation and economical storage of stock. The screens are made of Tyler double crimped wire mesh.

Operations were begun in August, 1916, the entire plant representing a cost of about $100,000. There were about 60,000 yards of grading to get the tracks down to the plant from the railroad, a distance of about 2,000 feet.

The material in the natural bank is about 50 per cent sand and 50 per cent gravel from ¼ to 1½ inches in size. Test holes have been sunk to 51 feet below the pool level and show that the material becomes coarser. To get the 50-50 proportion, the entire face must be worked, as the top is finer and the bottom coarser than this. Foreign material, including overburden, does not amount to over 1 per cent. The sand and gravel is clean in appearance, but there is no rinsing of the washed material and the sand bins are really settling basins. The water moves quite rapidly across these settling basins to the waste weirs and takes with it sand varying in fineness and amount according to

NO. 1—SCREENING AND WASHING HOUSE. GRAVEL BIN IS ABOVE GONDOLA ON EXTREME LEFT AND SAND BINS ARE ABOVE CARS AT THE RIGHT OF THE PLANT.



NO. 2—FEED PIPE LEADS AROUND POINT OF LAND FORMING A "J." NOTE COMPARATIVE SIZES OF WASHING PLANT AND SAND BINS.

the height of flashboard or waste weir.

DREDGE BOAT AND ITS MACHINERY.

The dredge is built with a cutter well in front. The pump is a 15-inch Morris, size 16, direct connected to a 400 h. p. variable speed motor, 25 per cent speed reduction. It is calculated to handle 225 cubic yards per hour on the basis of 10 per cent solids, and delivers 7,000 gallons per minute. It is working against a static head of 72 feet and a friction head of 35 feet. The suction pipe is 17 inches and the discharge end is 15-inch steel pipe. The dimensions of the scow are 26x70 feet and 5 feet deep. It was designed by the Morris Machine Works, Baldwinsville, N. Y., the makers of the pump. The pump motor is 400 volt, 400 h. p., 60 cycle induction, Westinghouse, full load 392, light 400. Power is obtained outside. In the rear of the scow are two 4-inch service pumps direct connected to 25 h. p. motors and are used for priming, for furnishing water for the pump seal and for water lubrication of the thrust bearing. They are also connected to fire service for protecting the dredge. These pumps are submerged. In each corner of the boat is a bilge pump direct connected to 1½ h. p. motors.

There are six drum hoists—one to each corner of the scow, one to the suction and one to spare. The spare one has winch heads extending through the walls of the dredge to the deck outside for handling, for example, stumps and logs. The big pump has the same suction as a 20-inch pump, with a manhole to get into the pump. There is another manhole at the discharge side of the pump, so that, counting in the flop valve, there are five manholes to get into the line.

The feed pipe extends around a pointed embankment and up an incline, and discharges into a rotary screen.

Gravel is sorted into two grades, ¼ to ¾-inch, and ¾ to 1½ inches. Should the customer desire special sizes, these can be obtained by inserting the proper screens. The coarseness of the sand can be controlled by the height of the wier boards at the waste pipe. The sand storage contains material about the coarseness of locomotive sand. As an item of interest, a stone 10x12x17 inches, a piece of granite, was lying

on the platform at the dscharge end of the pipe, when the plant was visited, which had been brought up a little while before.

EXPLANATION OF PICTURES

Picture No. 1 shows the plant in operation, gravel going into the bin under which the car in the left of the picture stands, while sand is being loaded into the car on the same track on which the engine stands. The white pipe from the sand bins at the far corner of the gondola in the foreground is a waste or overflow pipe. There is another pipe in the same position at the opposite end of the sand bin, hidden from view by the bin itself. The water issuing from the building at a point behind the man on the platform over the sand bins is from a bleeder. The chute projecting from the side of the building about three-quarters of the way up is for disposing of lumps of clay and other undesirable material before they reach the crusher, which fall into the pile on the ground below. At the extreme left may be seen the track which receives incoming empties. At the extreme right may be seen the toe of the slope of the outbound track, the track on which loads are set to be taken away by the railroad.

Note how the feed pipe in picture No. 2 leads around the point of land from the dredge to the point, making a "J" in form. It may be seen that the sand bins are about twice the width of the gravel bins, which are two in number, for different sizes. The suction is working about 35 feet below the surface of the pool, so that the working face is from 85 to 90 feet. At the present time sand is produced in excess of the demand, and it is planned to load this sand as needed onto cars by clamshell or dredging. There are two manholes in the feed pipe, one at the upper and one at the lower angle. When the pipe becomes stopped, the manhole is opened and the pump started, thus blowing out the sand and gravel.

Picture No. 3 is a view of the dredge boat "Aurora."

H. L. Beavis is superintendent, and to him we are indebted for much of the information on which this article is based.

NO. 3—VIEW OF THE DREDGE BOAT "AURORA" OPERATED BY THE CHAGRIN SAND AND GRAVEL COMPANY, EAST AURORA, OHIO.

AT THE LAKESHORE SAND COMPANY'S PLANT AT ALGONQUIN, ILL., THE MATERIAL IS CONVEYED TO THE SCREENS BY A 325-FOOT BELT ELEVATOR. THE OVERSIZE IS CRUSHED BY NO. 5'S ON THE GROUND AND RETURNED TO THE BIG INCLINE.

Huge Machines Give Great Output

Standard Gauge Locomotives and Gondolas Use Four and One-Half Miles of Track—Plant Has Capacity of Sixty Carloads of Sand and Gravel Daily

ONE OF THE MOST INTERESTING and probably the biggest-capacity sand and gravel plants in the United States is being operated at Algonquin, Ill., by the Lakeshore Sand Company, whose Chicago offices are in the Chamber of Commerce building. The plant covers 140 acres and has a daily capacity of 60 cars of screened sand and gravel, with ample storage space. Its pit averages 40 to 45 feet of face and in the bottom there are 4½ miles of standard gauge railway track. The plant is designed for winter work as well as summer, being equipped with drying screens. Sand known as Nos. 1, 2 and 2½ Torpedo; concrete aggregate Nos. 5, 6, 7, 8 and 9 are produced.

Stripping is accomplished with a Page dragline having an 85-foot boom and a 2-yard bucket. The top soil is about 7 feet deep and is thrown into the excavated pit by the dragline. This machine, of course, is stationed on the top of the bank. Working in the bottom of the pit is a Marion Model 60 steam shovel with a 2½-yard dipper which transfers the exposed gravel into center-dump gondolas of 100,000 pounds' capacity, built especially for this purpose after designs supplied by the sand and gravel concern. One loaded gondola is pulled to the foot of the inclined elevator by an American standard gauge locomotive and dumped into a hopper beneath the track. The company has three such trains. This hopper holds one full carload and feeds onto a belt line elevator 325 feet between centers consisting of a 36-inch Goodyear belt traveling on a Stephens-Adamson roller equipment.

Interesting Screening System

At the top of the inclined elevator the material passes over the pulley

and goes directly to three-in-one cylindrical screens having 2½-inch, 1¾-inch and 1¼-inch perforations. The material retained on the first, or 2½-inch screen, is spouted to two No. 5 McCollough and one 36-inch Simons disc crushers in a building adjacent to the screening plant. From these crushers it is carried by a Gandy 28-inch conveyor belt to the main elevator leading from the bottom of the pit to the top of the plant, and again goes through the cylindrical triple screens already mentioned.

The material rejected by the second screen (1¾-inch perforations) is chuted directly to the No. 9 bin, although provision has been made for recrushing should demand make it necessary.

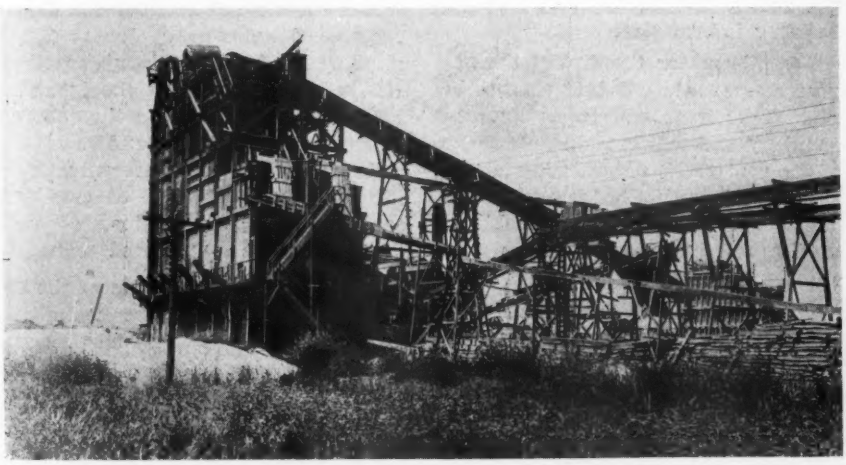
The sand and smaller material go to a pair of screens underneath the triple screens and at right angle to them. Up to this point no water has come in contact with the material and it is in these two screens that the water is added. These are conical in shape, 48 inches and 42 inches in diameter at the ends, 8 feet long, of Stephens-Adamson manufuacture. The material which does not go through them is called No. 8 and ranges in size from 1¼ inches to ¾-inch. It is chuted into the No. 8 bin.

The material passing through these screens goes to another pair of S-A screens underneath with perforations ½ and 7-16-inch. From these screens the retained material goes to bins, and the sand passing through is delivered to settling boxes from which it drops into bins.

Plant Has Two Loading Tracks

There are seven bins in all, with a total capacity of 20 carloads. Railroad cars are loaded from spouts by gravity, there being loading tracks on two sides of the plant. Shipments are made over the C. & N. W. Ry. The general car shortage has seriously affected the plant's operations, as it has all other sand and gravel and crushed stone producers. At present only about 13 empty cars a day are being received, when 60 are needed.

Provision has been made for storing dry material by means of a conveyor belt 24 inches wide (Gandy) traveling on a trestle and taking material from the No. 8 bin. This belt is parallel to the plant and unloads at its yard end. J. A. McMahon is superintendent.



A CONVEYOR BELT ON A TRESTLE, SHOWN AT THE RIGHT, TAKES MATERIAL FROM NO. 8 BIN TO STOCK-PILES FOR DRYING. CARS ARE LOADED BY GRAVITY THROUGH SPOUTS ON TWO OPPOSITE SIDES OF THE PLANT.

EDITORIAL

Announcement.

Beginning with the new year Pit and Quary will be published monthly, to reach its readers promply on the first of each month. Its more frequent appearance has been under consideration for some time and the dicision to issue every month was really determined by its readers. Since its first number, which came out one year ago, we have been repeatedly urged to take this step by many hundeds of subscribers and advertisers alike, who have written of their appreciation of its practical and constructive character.

We are much gratified at the generous approval of its efforts and the cordial reception it has been given, and along with the decision to issue monthly we are pleased to announce the completion of arrangements for the publication of contributions which will, we hope, even exceed those of the past in their content of business-building information.

For this reason the first of the new year seems to be the best time to begin. That issue will be a "Progress Number" and will contain an account of the past year's progress in methods and machinery. The material published will be extremely valuable in that it will be a record of the most efficient operating principles and the latest equipment designed for reducing production costs or increasing capacities.

Priority Order No. 2

Like a bolt of lightning from a clear sky came Chairman Robert S. Lovett's Priority Order No. 2, prohibiting railroads from delivering open-top cars to sand and gravel and crushed stone producers who furnish the material for building public highways. The decision was entirely unexpected and came without warning. It is parallel to being condemned to die without being given a trial. If any consideration at all was given to the position of the industries affected, the action taken surely does not so indicate.

There is no set of men more patriotic, and in better position to evidence and to show their patriotism by deeds than those in the sand and gravel and crushed stone business; but to accept unchallenged a ruling which immediately and completely puts out of action important and useful industries with millions of dollars in unfinished obligations, could not be reasonably expected of them.

The decision permits the railroads to provide cars in any quantity they see fit in transporting their own ballast material, and coal for the manufacture of unnecessary luxuries, but stops instantly all highway construction work, regardless of the fact that highways are essential in the delivery of food stuffs both to and from the railroads, while unnecessary luxuries, which utilize thousands of cars and consume thousands of tons of coal, could be entirely dispensed with.

The thirty-day suspension of the order being sought by the committee now in Washington made up of members of road-building organizations and those whose products are used in road building, is not only a reasonable request but represents the willingness of the industries so concerned to do their part unselfishly in co-operating with the Government.

LIBRARY U.S.

The National's Problem.

The 1918 meeting of the National Association of Sand and Gravel Producers will be epochal. No doubt the biggest attendance ever recorded will be on hand to participate in the eight selected topics for discussion and settlement, all of which are of great importance, two or three being vital. These topics are as follows:

1. "Plant Production," covering grading, standardization, quality, etc. The question of standardization of grades will undoubtedly bring forth varied opinions, but it is felt that these will be prompted by past practice and that a co-operative spirit will be prevalent amongst all delegates in bringing out all phases and conditions from which to draw the best factors on which to base the adoption of standard grades. It seems apparent to many that no less than five grades of material should be produced to meet the requirements of concrete construction. Engineers are becoming specific with regard to the sizes of concrete aggregates, and to meet these conditions these producers feel that there must be a manufacturing system that will divide material into several grades which can be later remixed in accordance with the provisions of construction specifications. Inequalities of material prevail in practically all deposits, and this can be taken care of only by an adequate manufacturing process. Some members may perhaps feel that three standard grades should be sufficient, provision being allowed for two intermediate grades for those having screens for producing these materials.

2. "Transporting Problems." The distressing shortage of railway cars has delivered a severe blow to the sand and gravel industry, and has decreased production probably 65 per cent. While all producers are extremely anxious to do their share towards relieving the freight car stringency, still it should be realized that the frantic endeavors throughout the country towards this end have resulted in some industries, particularly the sand, gravel and crushed stone, being required to accept more than their share of the burden as compared to other interests.

3. "Open Price Competition." Discussion of this subject will bring out the ideas of those present about the sale of material for a fair and legitimate price rather than by means of the cut-throat competition prevalent in many quarters at the present time. This does not mean that any steps whatever will be taken towards the formation of an illegal combination in restraint of trade, but is simply intended to point out the great injury to the industry by unfair and unbusinesslike selling methods.

4. "Extension and Promotion Work."

5. "Plant Economics," covering mechanical problems or any questions whatever in connection with plant operation, and no doubt will bring forth opinions as to the practicability of a co-operative purchasing plan.

6. "Cost Accounting."

7. "Trade Relations," dealing with such questions as trade discounts, differentials between dealers and contractors, etc.

8. "Insurance."

The above constitutes the first announcement of the convention subjects, and is by no means a complete schedule. One thing assured, however, is that these matters will be given a degree of consideration never before attempted, with the aim of the possible adoption of some standard of furture conduct. Certainly every sand and gravel producer in the United States should plan to be in attendance and take an active part in all of the discussions.

LINE-UP OF CARS ON THE QUARRY FLOOR GIVES AN IDEA OF THE DEPTH OF THE WORKING FACE.

Two Working Levels Afford Cost Comparisons

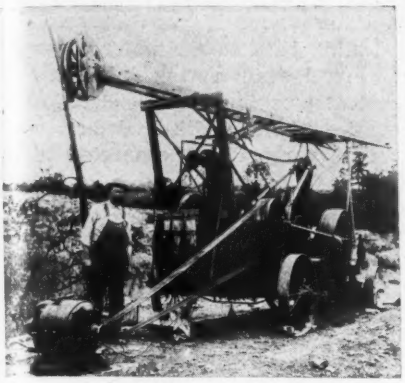
Both Machine and Hand Methods Are Utilized at Fluxing Stone Quarry Having a 170-Foot Face—Dolcito Plant Is One of the Best Equipped of Its Kind in the South.

LABOR, the big question with which American industrialism today is so greatly concerned, now is playing a leading part in the equipment and operations of the Dolcito limestone quarry at Birmingham, Ala. The tremendous deposits of limestone in this locality, extending to a depth of 350 to 700 feet of pure stone, are being quarried at an average rate of 1,200 tons a day, working both day and night shifts, but with a force of only 118 men for the two services.

The big white pit from which stone has been taken for the last twenty years has broadened out over an area of twelve acres and its strata of stone has been cut to a depth of 170 feet. A No. 14 Cyclone well drill is operated by two men, and the material blasted down is loaded onto Oliver and Western 4-yard 2-way side-dump cars by the steam shovel. Steam locomotives (three Porter 10-ton saddle tanks) then bring it to the bin above the skip car, which in turn carries it up the incline to the No. 8 McCully crusher, finally depositing the furnace size stone into railway cars through an under-side drop.

Comparative Loading Methods.

Operations in the Dolcito quarries are being carried on at present on two levels, the first and broadest covering an area of about eight acres with a steam shovel operated at night by a shift of 18 men; the second and deeper level covering a somewhat smaller area by hand loading on tram cars. This loading is done by day and usually with a working shift of about 100 men. On the first level the shovel, a Model 60 Marion with a two and a



GASOLINE - PROPELLED WELL DRILL WHICH MAKES SIX-INCH HOLES. IT IS SHOWN HERE GENERATING CURRENT TO FIRE HOLES PREVIOUSLY MADE BY ITSELF.

half-yard dipper, dumps into the four-yard dump-cars, which are hauled to the bin in trains of eight cars. During the night shift as much stone is moved by the shovel with its eighteen men as the hundred men can handle by hand loading in the daytime and at 25 per cent less cost.

In the deeper level tram cars of two and one-half tons capacity move by gravity from the loading centers to the horn tipple and there automatically dump into the balanced skip hoist which is carried by electric motor up the incline and emptied into the crusher. After passing through the crusher the stone is discharged onto a stationary grizzly screen and the small stone is elevated by bucket elevator of the chain type to a 48x20-inch rotary screen (Power and Mining Mchy. Co.), from which it is discharged into concrete storage bins. The rejections, or stone passing over the grizzly, is loaded directly into railway cars beneath.

Electricity is used almost exclusively at the Dolcito quarry in generating power. It carries the skip car to the crusher, sparks the fuses for well-drill blasting, drives the motor for pumping out the seep water, propels the well drill and soon will pull the side-dump cars working with the steam shovel.

Dual Drilling Methods.

The well drill is of first importance. Several weeks ago a double-line shot of 15 holes each 100 feet deep brought

TRAM-CARS MOVE BY GRAVITY FROM LOADING CENTERS TO THE HORN TIPPLE AND THERE AUTOMATICALLY DUMP INTO THE BALANCED SKIP

down 54,000 tons of stone. The holes are six inches in diameter and are usually sunk several feet below the depth sought in the blast. About 259 cases of powder were required for the big blast just mentioned. The powder is packed into the hole to within 10 feet of the surface, when dirt is thrown in and packed tight to force the shot downward. In addition to the well drill, six 1½-inch E 24 Ingersoll-Sergeant piston air drills are in constant operation along the face of the second level. These drills reach a depth of about 20 feet and are operated with compressed air generated from the power house of the plant. The old methods of breaking by hand stone too large to go into the crusher, or by the "dobie" process, have been abandoned in the Dolcito quarry and in their places the "pop" (Ingersoll-Rand rotating jackhammer) drill has been put to use. This drill is also operated by compressed air and drills 80 to 100 feet a day, whereas the old methods of hand and "dobie" drills could reach a maximum of out 20 feet a day. These holes at present are shot with the battery box.

Combatting Water Seepage.

Coming back to the water seepage, an ever-flowing spring necessitates constant pumping with an electrically operated 4-inch Allis-Chalmers centrifugal pump direct connected to a 25-h. p. General Electric motor. One man can watch the pump house along with his other work. An 8-inch Allis-Chalmers centrifugal pump direct connected to a 75-h. p. General Electric motor also is used. All the motors throughout the plant were furnished by the General Electric Company and are equipped with modern safety devices. The coal used at the quarry is brought in by rail up to a dock above the power house in bottom-dump cars and dumped directly into the coal storage house.

The strata of limestone in which the Dolcito quarry has been sunk is about three miles wide and fifty miles long. The stone is used entirely for furnace flux and is about 55 per cent lime and 45 per cent magnesia. There are no dimension-cut limestone quarries in this part of the state, all three quarries in the district supplying stone for use in steel and iron refining plants.

CRUSHING PLANT OF THE DOLCITO QUARRY SHOWING GONDOLAS FOR LOADING BENEATH IT.

Check Voucher System Gives Constant Record of Transactions

A system of check vouchers is utilized by the Dunbar Stone Co., Detroit, Mich., a subsidiary of the Dunbar & Sullivan Dredging Co., that reduces the office work to a minimum. Drivers of hired trucks are each given one of the forms shown here and on this they enter in ink the ticket number, the amount of material (in tons), the rate of pay due him for each load and the total amount to be paid him. This check voucher has a yellow duplicate and a carbon sheet, the latter being retained by the dis-

HAULAGE CHECK VOUCHER

DUNBAR & SULLIVAN DREDGING CO., Stone Dept.
River Rouge, Mich.

No.

$ (LEAVE BLANK)

SATURDAY 191

THE RIVER ROUGE SAVINGS BANK

PAY TO THE ORDER OF (PAYEE CONTRACTOR WHO SIGNS HERE FOR IDENTIFICATION)

THE SUM OF (LEAVE BLANK) DOLLARS

DUNBAR & SULLIVAN DREDGING CO.

RECEIVED PAYMENT IN FULL TO DATE

(TO BE SIGNED AT BANK BY PAYEE CONTRACTOR)

(LEAVE BLANK)
MANAGER STONE DEPT.

DATE

CORRECT-
APPROVED-

(KEEP NEAT—FOLD HERE ONLY—WORTHLESS IF TORN OFF.)

DETAIL

TICKET NOS.	TONS	RATE	TICKET NOS.	TONS	RATE
FWD.					FWD.

SUMMARY

TONS	AMT.
TOTAL	TOTAL

No.

DUNBAR AND SULLIVAN DREDGING CO., Stone Dept.
RIVER ROUGE, MICH.

$ LEAVE BLANK

Saturday 191

THE RIVER ROUGE SAVINGS BANK, (when this check is properly countersigned) will pay to

(EMPLOYEE WHO SIGNS ON THIS LINE FOR IDENTIFICATION AT BANK) the sum of

LEAVE BLANK DOLLARS

Which the payee by endorsement on back hereof acknowledges to be in full for all claims, except as noted hereon, against the **Dunbar and Sullivan Dredging Co.** to date.

Worked subject to Workmen's Compensation Law as

Correct

Foreman

VALID ONLY WHEN COUNTERSIGNED BY Manager Stone Dept.

NOT NEGOTIABLE

NOTE HERE AMOUNT OF CLAIM, IF ANY, OTHER THAN FOR WAGES AS DETAILED BELOW

DO NOT WRITE HERE

DETAIL OF TIME TO BE FILLED OUT BY EMPLOYE

HOURS

Back Time	S	M	T	W	T	F	S	Weekly Totals	Total Hours Two Weeks	Rate per Hour	Checked $	Checked cts.

VOUCHER CHECKS THAT REDUCE OFFICE LABOR AND AVOID DISPUTES.

patcher when each load goes out and the other two being handed to the driver, one being for himself and the other to be receipted by the contractor. Before quitting time the dispatcher turns his tickets over to the officer, the consignee is invoiced from them and they are then sorted for checking against the driver. At the end of the week they are checked against the driver's voucher check and again distributed in numerical order for reference.

After being checked and approved the voucher checks are turned over to the trucking concern who cashes them at the bank. By his having already signed the voucher once he has merely to sign the check in the proper space to obtain payment, the two signatures completing the identification. The stone company, by having carbon copies of the checks while the voucher check is passing through the bank, has a record of transactions constantly at hand.

The lower form in the illustration shows the method of paying employes. On it he makes his own record of time worked and this is checked against his time-clock ticket. He has previously signed on the line designated "for identification at bank," so that his signing the check on the back will enable him to cash it at any bank. For his convenience, however, a nearby bank is kept open on the evening of pay day. It will be noted that there is a boxed portion of the check in which he sets down any other claim except wages. If the employe is unable to write he identifies himself by means of a print of his right thumb. A signed check is acknowledgment that each employe is working under the Workmen's Compensation Law every time he is paid. The diagrams of these check voucher forms are reproduced through the courtesy of "Concrete," of Detroit.

Stone Production in 1916

THE VALUE OF THE STONE produced in the United States in 1916 was $79,041,699, as reported to G. F. Loughlin, of the United States Geological Survey, Department of the Interior, an increase of nearly 6 per cent over the value of 1915.

Of the total value over 52 per cent, or $41,319,871, was represented by limestone, an increase of more than 17 per cent over the value of 1915.

The leading states and the value of their output, which represented over 63 per cent of the total, were as follows:

Pennsylvania	$11,021,655
Ohio	6,611,266
Vermont	5,691,420
New York	5,342,954
Indiana	4,657,813
Illinois	3,403,094
Massachusetts	3,138,165
California	3,133,305
Wisconsin	2,757,790
Michigan	2,494,284
Missouri	2,242,742

Of the 48 producing states 32 increased in value of output and 18 decreased.

The number of active quarries decreased 252—from 3,278 to 3,026.

According to uses, the value of stone produced was distributed as follows:

Paving	2,687,665
Curbing	1,611,001
Flagging	409,665
Rubble	825,330
Riprap	3,635,167
Crushed	29,462,952
Flux (limestone)	13,936,882
Ganister (sandstone)	529,805
Other uses	3,905,366
Total	$79,041,693

Why Some Quarries Do Not Pay

A Discussion Showing Wherein Quarry Men So Handle Their Work as to Eat up Their Profits—Four Phases of Quarry Operation Are Analyzed.

Each quarry is to a great extent a proposition unto itself; nevertheless, it is possible to lay down certain fundamental principles, and a close analysis of the methods of operations in many quarries permits certain conclusions to be drawn, showing wherein the methods following in a large number of quarries allow for wastes and excessive costs. It is to call attention to some of these things that this article is written.

By D. J. HAUER.

FIRST OF ALL, there must be the proper stone crushing plant in a quarry, with the accompanying hoist and handling machinery, if stone is to be produced cheaply. Not only must the machines be modern and of sufficient capacity, but must be arranged and installed so as to give efficient results. It is quite surprising how many crusher plants have old crushers, to some extent worn out, and of such build and types that they cannot produce crushed stone in sufficient quantities to make their quarry pay. Then, too, even if the machines are new, the arrangement may be such as to materially reduce the output.

In many quarries during the past ten years, much attention has been given to the plant, and in some cases entire plants have been rebuilt and modern machinery installed at the cost of many thousands of dollars, yet such plants are not only failing to make a profit, but have never been run to their full capacity. One plant designed and rebuilt to give a production of 1,000 tons per day has seldom reached 600 tons per day, and its average output has been less than 500 tons. Another plant designed for 3,000 tons per day has never reached it. It is the same story for large numbers of small plants. In such cases the trouble is not with the plant, but with the quarry end of the operation.

Quarrying should always be a series of events that co-ordinate one with the other. The cost of one will depend somewhat upon the other. Thus if the total cost of running the crusher plant is $100 per day, and 1,000 tons of stone is transported to the crusher and put through it, then the cost of crushing would be ten cents per ton; but if the transportation end was poor and only 500 tons of stone is furnished to the crusher, then the cost, due to poor transportation, is forced up to twenty cents per ton. Poor crusher operation can increase other costs.

Four Classes of Work.

It is only possible to reduce quarry costs by considering and studying each operation by itself and then as connected with the entire work. For this purpose the crushed stone business can be divided into four classes of work.

1. Stripping the Ledge.
2. Drilling and Blasting.
3. Loading Stone.
4. Transporting Stone.

Any one of these operations can be done at such a cost as to eat up the ordinary profits that can be made in producing a ton of crushed stone. On the other hand, it is possible, except under unusual conditions, to keep the cost of each so small as to produce a ton of rock and deliver it to the crusher for a reasonable amount.

Stripping the Ledge.

In some few quarries there is little if any stripping; in others there may not only be an earth overburden, but likewise a great mass of disintegrated or partly disintegrated rock that must be disposed of with the earth. Where this stone is a small percentage of the entire output, some of it can be passed through the crusher, thus disposing of it either in the finer or in the dust.

Generally speaking, there are two methods of handling the stripping in a quarry. One is to take the material from the top of the quarry, moving it back from the face of the ledge or toward the two sides. The others is to let the overburden go down to the quarry floor and haul it away from there to a spoil bank.

In the years past when quarry operations were small and there was little excavating machinery on the market, these methods were the practical ones, and it was even necessary to do most of this work by hand. For these reasons and following precedent, much stripping even in extensive quarry operations is still done by these two methods. It should be needless to say that the hand methods should be obsolete, while there are a number of machine methods that even get away from these two.

Stripping should be done in the off season, as during the favorable weather of late autumn or early spring. Then enough of an area should be stripped to allow stone to be taken out for one or more seasons. In no case, except to get it out of deep pockets, should the dirt be handled in such a manner as to make it necessary to re-handle it in another stripping operation. It is surprising how often this is done even in large quarries.

In place of hand methods there are many cheap ways of excavating and handling overburden. Small steam shovels can be used, power scrapers, grab buckets, slack and rigid cable ways, four-wheeled scrapers, and other types more or less economical, while in some quarries this work can be done by hydraulic methods at an extremely small cost.

Drilling and Blasting.

There are now quite a number of methods of drilling the ledge for blasting. In advertising new types of drills much publicity has been given to methods of rock drilling. For these reasons little hand drilling is now done in any but the smallest quarries.

The three general methods followed are by steam or air tripod drills, by well drillers and the small hammer drills. For deep holes and heavy blasting there can be little doubt that the well driller has greatly reduced the cost of drilling per ton of rock produced. For this reason it has been adopted by many quarry operators. The fact that the hammer drills will save considerable money in breaking up boulders and cutting off toes of slopes has led to their use, especially in connection with well drillers, for the tendency in heavy blasting is to throw down great masses of rock that must be broken up to be handled by the crushers.

The smaller size of hammer drills will only make from four to six-foot holes, but larger ones will give a hole twelve feet or more in depth. This has led some quarrymen to use these drills exclusively in their quarries.

It should be readily seen that this is a mistake, for such holes can only be sprung and charged with light loads of explosives, causing an excessive cost for both the drilling and blasting per ton of rock produced. Outside of short holes for breaking toes of slopes and for holes for blocking boulders, these excellent drills should not be used.

Instead, tripod drills should be employed. No matter how rock is blasted there is always some use in a quarry for tripod drills for holes from twelve to twenty feet deep. The hammer drill is cheaper for short holes than a

tripod drill, but for deep snake holes the tripod drill is necessary, also for drilling benches and cutting out those sharp noses of rock that are frequently caused by the heavy blasting of well drill holes.

To scrap tripod drills in a quarry and use well drills alone is a great mistake. The writer has seen this mistake made frequently. It may not be necessary to use the tripod drills daily, but there is always some need for them in every quarry.

Thus, to do the most economical drilling and blasting in any quarry, there should be three kinds of drills used. For the heavy blasts and deep holes well drillers should be used. For breasting up the ledge for the shooting of the well drill holes the tripod drill should be used, while for shallow holes and breaking up boulders, the hammer drills should be employed. This means not only the saving of much drilling, but also the most economical results from the explosives. The cost of each in many quarries is excessive.

The "Gopher" Method.

Another way of blasting is that of driving small tunnels with cross heads. This is sometimes termed the "gopher" method. In some deep ledges this is the most economical method for very heavy blasting. The large charge of explosives is placed at the most favorable points and it is not possible for the charge to barrel the hole as is done to some extent in deep hole blasting, leaving large masses of rock standing in front of the holes.

There are, though, some objections to this method. One is the slowness of performing the blast; however, the tunnels for one season can be driven during the seasan before or during the preceding winter. Another is the high cost of driving the tunnels. A third is the breaking down of large boulders, which can only be prevented by drilling well drill holes from the top of the ledge, so as to break up and throw down the top of the ledge just as the mines are being exploded.

Because of the success of the gopher method in blasting some deep ledges some quarrymen have adopted this method for shallower ledges, where the cost has been excessive and less than two tons of rock have been thrown down by a pound of dynamite. In one case the writer knows of tunnels being used and well drill holes also, when the same amount could have been loosened by using the drill holes only, thus saving seven or eight hundred feet of tunnels.

It is a great mistake to do quarry blasting without first springing the drill holes. This was always done for black powder blasting, but when it was found that shallow holes could be shot with dynamite to advantage without springing, many adopted shooting all their holes without springing. Another reason for doing away with springing was the size of the well drill holes, as several hundred pounds of dynamite can be packed in a few feet of these large diameter holes.

In deep holes, to prevent throwing down so many large boulders the charges of explosives should be broken up. As much powder as is needed should be placed in the bottom of the spring hole, then about a third to half way up another charge should be placed, and higher up in the hole a third charge should be used.

Loading Rock.

If efficient drilling and blasting is done on the ledge then money can be saved in handling and loading the rock. The cost of the loading will also be effected by the stripping of the ledge. If the overburden is thrown down upon the quarry floor, the workers must handle it, curtailing the output of rock and adding to the cost of cleaning up the quarry floor.

Steam shovels and several other types of machines can be used to advantage in loading rocks into cars.

For large operations, some type of machine loading should be used, but in many quarries where the output is limited, the loading by hand is economical, if it is managed properly.

The broken rock should never be handled twice, as is done in too many quarries. Some of the rock to be sledged and broken up must be handled for this purpose, first in large pieces or boulders and then re-handled in loading, but this is no reason for re-handling all the rock.

An important consideration is the type of car to be used. It is quite surprising how many quarries use either a car that is expensive to load, or one that is costly to dump and feed the rock into the crushers. Too little consideration is given to selecting cars, and the method of loading and unloading. Certain types of cars are in prevalent use in different sections of the country, whether they are suited to work in those particular quarries or not. This is an extensive mistake, as the type of car used can mean the difference of from five to fifteen cents in the cost of producing a ton of crushed stone.

The writer has seen quarries where hand loading was being done when a steam shovel should be used, and *vice versa*. The same thing can be said of cars, that is, hand methods were used to load cars meant for machine loading and the machine cars meant for hand loading.

Some quarrymen who are alert to most of their work, as stripping, blasting, etc., become so accustomed to the loading, which is a daily routine, while the other work may not be, that they do not stop to consider whether the loading is being done for the "low dollar," to use a common expression. A small item of waste in this daily routine can amount to many hundred, even thousands, of dollars in a year's operation. Constant thought and attention must be given to this part of quarrying.

Transporting Rock.

The same thing is true in carrying the rock from the ledge to the crushers. Many rock men consider this operation with loading, and they are closely allied; but if the best results are to be obtained each should be studied separately and then together.

In some quarries dump carts and wagons are still used to haul the broken stone to the crushers. This is the most expensive method and it means to curtail the output, unless an excessive number of vehicles are used. They are expensive to load and with the present high prices of horses and mules and also of feed are expensive to operate. A cableway may be fairly cheap to operate, but inasmuch as half of the time of the cableway is used in carrying back the empty skips or buckets and there is bound to be some lost time due to delays, it can be seen that seldom more than four hours out of ten are used for carrying loads to the crusher. With this kind of transportation it is seldom possible to keep a crusher at work to its full capacity, unless the crusher is a small one and the cable skips are large, thus supplying the crusher with stone faster than it will take it. The writer has never seen these conditions with a cable way. He knows of one quarryman who boasts of the fact that he is the only man in his city that has a cable way in his quarry. Although there are uses for cableways in connection with quarries, yet this man is adding to his costs with a cableway, and yet is satisfied.

Cars of some type are the logical means of transporting stone in quarries. With them and the proper track arrangements it is possible to feed a constant stream of stone into the crushers and something like the capacity of the plant can be maintained.

The merits of the various methods and equipment used in these operations can only be judged from accurate cost records. Few quarries

keep costs so as to tell the money expended on each operation, and by using the day's output arrive at the unit costs. Poor cost keeping is the cause of losing much money in crushed stone quarries. A summary of costs does not show such things, and although some profit may be made yet the wastes existing curtail the profits, and really mean that money is lost.

The easiest method of cutting out such wastes, of knowing if the proper methods and equipment are being used and the most economical results obtained, is to devise a proper cost keeping system and analyze the cost records daily. Then a quarry man knows what he is doing and does not have to wait until the end of the season or a year to know if he has lost money.

THE PICTURE ABOVE shows the tunnel entrance to the limestone quarry of the Cheshire Lime Works at Farnams, Mass. The quarry is 180 feet deep and 350 feet in diameter. Three weeks ago four 8-inch bore holes were driven vertically along one of the sides of the quarry, 175 feet deep each. These four holes were loaded with 7½ tons of dynamite, which was set off electrically in one blast. This was probably one of the largest blasts in New England.

The view at the right shows dynamite loading machine, used for loading the holes. It is driven by a 20 h. p. gasoline engine and is operated by two men.

Motor Truck Haulage

By GEORGE HOGARTH,

Provincial Engineer of Highways, Ontario.

HAULING by means of motor trucks has come into general use in the cities during the last few years, and in view of the popularity enjoyed by the motor truck for hauling crushed stone, sand and gravel, it is advisable to look closely into its methods of operation and costs for building roads in the country. One advantage enjoyed by the truck in the city is that everywhere good pavements are found, and a low-powered truck is able to move a large load satisfactorily under all weather conditions and practically for 300 days per year. It is well to point to this fact, and also as a comparison to call attention to the general state of country roads during the spring, autumn and winter months of the year, when impassable conditions exist. For hauling by truck in the country it is believed that 150 working days per year will be about the maximum that truck operation is possible.

THE CAPACITY OF THE TRUCK to purchase is important. Practically every size from 1 to 6 tons is manufactured and sold today. The heavier truck is seen at its best when operating over good roads, but for general hauling purposes the lighter truck will give better satisfaction. The military authorities favor 1½ and 3 ton trucks, and these sizes have given satisfaction over what are described as "horrible" roads. Contractors on road work in the United States claim that a 5-ton truck will usually spend a good deal of time extricating itself from ruts or broken bridges or culverts, and during wet weather pulling itself out of the ditch. They have had trouble with the heavy truck, and today they believe the 3 or 3½ ton truck is the best to use. For one reason or another the heavy truck is frequently delayed on the road. Delays to such equipment decrease the efficiency greatly, as in order to get proper results a truck must be operated continuously.

Wheel Base Important.

In operating a truck on road construction it is often impossible to choose turning places, and in some cases turns must be made in very close quarters. For that reason it is well to consider the wheel base of the truck being purchased. A long wheel base may prove awkward. With a truck having a wheel base of 124 inches it is possible to turn around on a 12-foot road with a sand shoulder.

In road construction one 3½-ton truck will usually replace six teams, and with that data and some experience in the operation of trucks it is possible to estimate the cost of motor truck hauling. It will usually be found that on road construction the cost of tire renewals is fairly high and will amount to 5 to 5½ cents per mile of run.

An estimate of hauling by 3-ton motor truck, based on 150 days' operation per year, is as follows:

Cost of truck, $6,000.

ANNUAL COST OF OPERATION.

Interest on investment, 6 per cent on $6,000		$ 360.00
Depreciation per year, 20 per cent		1,200.00
Repairs		200.00
Operating charges—		
Chauffeur, 6 mos. at $80	$480.00	
Gas and oil, $4 per day	600.00	
Tires	375.00	1,455.00
Superintendence, 5 per cent of $3,215		160.75
Total		$3,375.75

In one season's operation under favorable conditions the truck will haul about 20,000 ton-miles at a cost of $3,375.75, or 17 cents per ton-mile.

Such a truck may be good for a life of more than five years, and in some cases ten years is the economical life of well-built trucks, so that the cost per ton-mile for moving materials by motor truck will probably be from 12 to 15 cents.

Additional Roads for Illinois.

Cook county, Illinois, at her judicial election Nov. 6 voted upon the issue of $1,000,000 for the improvement of 12 miles of the Lincoln Highway from the Indiana-Illinois state line to Chicago Heights, the Chicago-Wisconsin state line road in Cook county and another road from Chicago to Joliet connecting with the Lincoln Highway at that point. This is the forerunner of extensive road improvements in the state. A $60,000,000 bond issue is to be submitted to the voters in 1918 and the permanent improvement of the through connecting highways in the state is to follow.

The state highway department has issued Bulletin 14, prepared by F. L. Roman, testing engineer, which contains a list of the sand and gravel and crushed stone producers furnishing materials for highway work in the state. A paragraph is devoted to each concern and tells of the manner of operation, location, shipping facilities, capacity and character of material.

Pulverized Limestone for Agricultural Use.

Pulverized limestone continues to be in favor as a soil sweetener or fertilizer, according to reports from producers. Since the figures of production were first compiled in 1911 the industry has steadily increased, and the output for 1916 of 1,066,376 short tons, valued at $1,146,582, represents a gain of 512 per cent in quantity and 460 per cent in value for the six years. The increase for 1916 compared with 1915 was about 32 per cent in quantity and 28 per cent in value.

The states contributing 73 per cent of the quantity and 75 per cent of the value of pulverized stone to the trade in 1916 were as follows:

	Quantity (short tons).	Value.
New York	102,608	$164,237
Illinois	203,829	135,908
Pennsylvania	73,301	129,574
Virginia	146,703	106,166
North Carolina	53,532	77,101
West Virginia	47,709	74,865
Tennessee	66,854	64,910
Ohio	55,236	54,591
Vermont	27,489	54.535

Twenty-three other states contributed to the total. The average price per ton was $1.08 in 1916, 2 cents less than in 1915.

In some localities the pulverized material is a by-product of the crushed-stone and building-stone industries; in others the limestone is ground for this purpose entirely.

ASSOCIATION ACTIVITIES

Agricultural Limestone Men Recount Year's Accomplishments

Annual Meeting Held at Columbus, at Which the New Ohio Limestone Law, Car Shortage and Promotion Plans Are Discussed—Officers Re-elected.

MEMBERS of the Agricultural Lime and Limestone Association gathered in the office of Manager G. J. Wilder on Oct. 2 for the third annual convention. Considerable business having to do with both the industry in general and the association in particular was transacted. Vice-president F. R. Kanengeiser called the meeting to order. President H. V. Briggle, Canton, Ohio, and Vice-president F. R. Kanengeiser, Youngstown, Ohio, were re-elected by unanimous vote. The board of directors, by unanimous choice, follow: H. V. Briggle, F. R. Kanengeiser, J. W. Wirth, Canton, Ohio; G. J. Wilder and W. H. Hoagland, Columbus, Ohio; Henry Angel, Cleveland, Ohio, and E. T. Paul, Lewisburgh, Ohio. The election of the secretary-treasurer and manager was not held at this time, as the offices are appointive. At a meeting of the executive committee in Cleveland Nov. 9, J. W. Wirth and G. J. Wilder were retained in their respective capacities.

ONE YEAR'S ACCOMPLISHMENTS.

Manager Wilder's report covered the past year's activities and dealt especially with the association's influence in putting through the legislature the new Ohio Agricultural Lime and Limestone law, the text of which was published in the September issue of Pit and Quarry. He also told of the efforts to secure from the rate commission a ruling placing shipments on a mileage basis and fixing the rate per mile. No decision has as yet been made by the commission but it is expected that the association's influence will secure favorable action.

The car shortage has been a very serious factor in the industry, many plants being unable to secure more than 35 per cent of the number needed. While the shortage is general, it cannot be denied that there is an unequal and unfair distribution of cars and that the limestone men are not receiving a just proportion of them. The association recently sent representatives to Washington and it is hoped that better conditions will prevail in the future. Manager Wilder has been attending farmers' institutes, and county fairs, giving lectures to farmers and other buyers and users of crushed stone. Along this line he has already gotten out one booklet and has another in course of preparation. The open price policy was adopted.

The members attended a luncheon given by the Columbus Rotary Club and the Columbus Chamber of Commerce to celebrate the completion of the new branch of the Chesapeake & Ohio Railroad which links up with the Hocking Valley so as to form a new highway from Tidewater to Lake Erie, greatly augmenting the city's transportation facilities.

The afternoon session was devoted to the discussion of sales and production, and Messrs. W. H. Hoagland and H. B. Briggle presented a motion to the effect that plant quotations be sent to Manager Wilder each month, who would incorporate the same into a monthly trade report to be sent to all members. This motion was carried.

Secretary-Treasurer Wirth's annual report showed the association to be financially strong.

County Officials Boost Road Building

Pass Resolutions at Rousing Good Roads Meeting to Prevent Lagging of Highway Improvement.

The following resolutions were unanimously adopted at a meeting called by the State Highway Advisory Board and State Highway Commissioner of Ohio. The meeting was composed of county surveyors, county commissioners, county auditors and county prosecuting attorneys and was held in Columbus. It was largely attended and much enthusiasm was aroused in favor of a vigorous go-ahead road-building program. Resolutions were presented by Secretary of the Ohio Good Roads Federation W. A. Alsdorf, and are as follows:

WHEREAS, No greater national necessity exists than the need of improved transportation facilities, in order to get foodstuffs to market, to relieve congested railroad terminals and to get manufactured products from the factories to the jobber and consumer, and to help Uncle Sam's war program; and

WHEREAS, No more effective blow can be struck at the high cost of living than by putting the farmers and market gardeners of the state in close touch with the great centers of population than the construction of a complete system of modern roads available for use in all seasons; and

WHEREAS, Ohio has a fixed road program with revenues established, and work under way which, in the recent words of Governor James M. Cox, "must go forward to completion," and counties and townships are co-operating with the state and nation in highway improvements; now therefore,

BE IT RESOLVED, By the officials of the State Highway Department and the county commissioners, county surveyors and county auditors of the state of Ohio, that, for these reasons and to meet the exigencies of war we demand a harmonious co-operation of road officials in the performance of their duties, the abandonment of makeshift policies and the adoption of a vigorous, go-ahead road building program in the state of Ohio; and

BE IT FURTHER RESOLVED, That we pledge our united support to the state highway commissioner and the state highway advisory Board in the collection and compilation of all data necessary to secure through the action of the National Council of Defense and other agencies of the Federal and state governments an adequate supply of cars for the shipment of road building materials; and also in the collection of such information as may be necessary in the securing of labor and the marketing of securities; and

BE IT FURTHER RESOLVED, That copies of these resolutions be forwarded to the National Council of Defense, the Secretary of Agriculture, the Interstate Commerce Commission, the Ohio Public Utilities Commission and Ohio senators and representatives in the National Congress and that copies of the same be furnished to the press of the state.

National S. and G. Meeting February 7-8.

The annual meeting of the National Association of Sand and Gravel Producers will be held in Chicago Feb. 7 and 8, 1918. The committee is now at work preparing a program and making full arrangements, which will be completed and announced a sufficient time in advance of the meeting to enable one to arrange to attend. A committee composed of Secretary E. Guy Sutton, Williamsport, Ind.; J. L. Sheiley, St. Paul, Minn., and Burton H. Atwood, Chicago, has been making active efforts towards the expansion of the association's influence in protecting itself in matters of legislation, transportation, etc.

The experiences of the individual producers who recently appeared before the commission on car ruling in Washington has forced the conviction upon those who are better informed of the industry's needs that definite knowledge of the size and character of

the sand and gravel business must be had before favorable ruling can be obtained from those who decide freight car matters. It developed that the car ruling commission, and the railroads, even, had but scant knowledge of the magnitude of the sand and gravel industry and the tremendous freight receipts derived therefrom. To gain this specific knowledge Secretary Sutton subsequently sent out literature which when properly filled out and returned, enables the association to state in round numbers the actual extent of the activities of the industry, capable of verification.

The meeting will be held at the Great Northern hotel. Eight subjects, in particular, will be presented for consideration, being "Plant Production" (including the possible adoption of a standard of grades), "Transportation Problems," "Open Price Competition," "Extension and Promotion Work," "Plant Economics," "Cost Accounting," "Trade Relations" and "Insurance." These are more fully discussed on the editorial page in this issue.

No Cobwebs in Indiana Headquarters.

Secretary Frank W. Connell is keeping up and even exceeding the pace he long ago set in the interests of the Indiana Crushed Stone Association. He has his office in the Hume-Mansur building in Indianapolis and every mail carries therefrom some good stroke for the upbuilding of the crushed stone organization. Perhaps it is a picture of a highway which, despite hard usage, has demonstrated that "Macadam roads properly maintained will never wear out;" or it may be a reprint of an article from one of the trade publications dealing with road construction or maintenance; occasionally it is a little reminder that macadam roadways give the greatest mileage at the lowest cost and upkeep expense and are economical and satisfactory generally. The association holds monthly meetings, the last one being held Nov. 8 at Indianapolis.

Live Booster for Wisconsin.

What will undoubtedly prove to be an effective publicity medium is the little booklet, "Better Roads for Wisconsin," which has been issued by the Wisconsin Crushed Stone Association and circulated free of charge within the state.

It contains twelve pages of live news matter pertaining to the use of crushed stone in both city streets and country roads, and the points discussed are brought out more clearly by the use of many pictures. There are excerpts from the statements of road building experts with regard to not only construction methods but economic features, such as the use of convict labor, the road building education of the farmer, obtaining road materials, the discussion of the strength of concrete made of various aggregates, and other subjects.

Secretary R. W. Scherer. of Milwaukee, will be glad to send anyone, whether a resident of the state or not, copies- of the publication upon re quest.

A Non-Skid Road Surface.

There has been much talk and advertising of non-skid automobile tires, but no one has paid much attention to a non-skid road for autos to run upon. The fact is well known that a smooth asphalt surface is particularly slippery in wet weather, and for that matter most every kind of smooth road surface, including brick, concrete, water-bound macadam and tar macadam, is somewhat of this nature. Ice and sleet are particularly bad, and mountainous roads are almost impassable in cold weather, owing to the

sharp curves and steep grades. Even horse-drawn vehicles have great difficulty in traveling over roads of this nature.

In the mountainous districts of western Maryland an experiment is being conducted, and closely watched, on a non-skid surface. This road is a tar-bound macadam on a water-bound macadam foundation. Several grades of tar binder as a surface treatment have been previously used, but under heavy rolling and continued traffic the binder has flushed up through the stone chip covering, making a smooth surface which became very slippery when wet.

This year a special grade of Pontar was used on the surface as a binder, and it is hoped a non-skid surface has resulted, for up to the present time the results have been very encouraging. The binding material used has not flushed up under the roller and traffic as have previous treatments, and the resulting surface pitted, somewhat after the fashion of smallpox markings.

Foundations Blasted with Lime.

Freshly slacked lime is now being used for blasting rock or removing foundations so near other structures that powder could not be used without injury to the latter. Holes are drilled 2½ or 3 inches in diameter and filled a foot at a time, water being added to fill the voids, after which more lime and water is added until the hole is five-sixths full. The top part of the hole is then filled with tamping and well rammed. The rock begins to crack within a few minutes. It is quite necessary that this manner of loading the holes be speedily done, for otherwise the tamping would be blown out with such force that the workmen may be injured.

Two Remarkable Examples of the Downward Action of Blasting Dynamite.

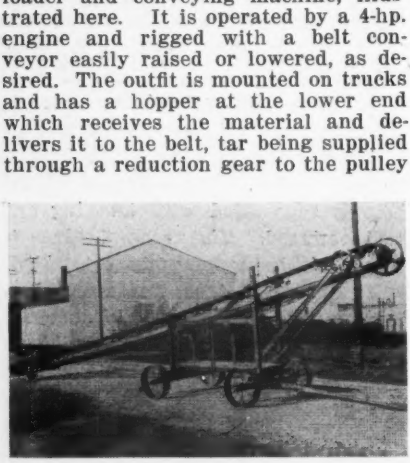
AT LEFT—VIEW SHOWING THE DOWNWARD AND RADIAL ACTION OF DYNAMITE.

AT RIGHT — REGION NEAR THE BOTTOM OF THE BORE HOLE AFTER THE BLAST.

MEN AND MACHINERY

Portable Loader and Conveyor.

Displacing ten or more horses by doing work equal to what they can do is the claim for the "E. & S." portable loader and conveying machine, illustrated here. It is operated by a 4-hp. engine and rigged with a belt conveyor easily raised or lowered, as desired. The outfit is mounted on trucks and has a hopper at the lower end which receives the material and delivers it to the belt, tar being supplied through a reduction gear to the pulley



TRUCK-MOUNTED LOADING AND CONVEYING MACHINE THAT CAN BE ADJUSTED TO MEET LOCAL CONDITIONS.

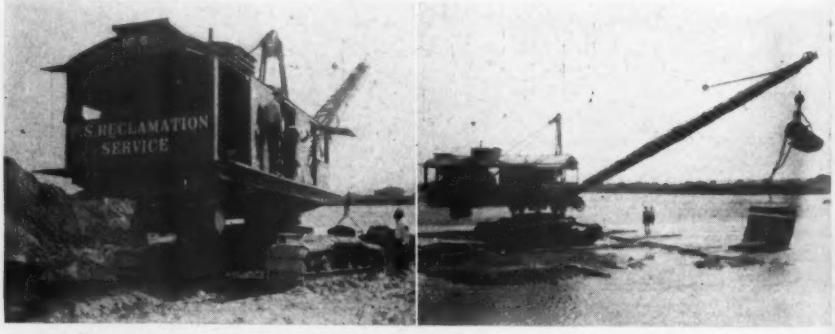
at the upper end of the conveyor. The engine is set directly on the truck platform. The design of the machine permits it to load at levels below that of the street, a decided advantage because of the eliminating of the difficulties of hauling loaded wagons up steep or uneven embankments. It can also be readily used for loading on stock piles of sand, gravel, crushed stone or coal to wagons or railroad cars. It has dust proof roller bearings and is practically of steel construction reinforced at places with wood. Any width of belt may be used. It is manufactured by the E. & S. Screening Machinery Company.

Dragline Excavators Cross River.

On Aug. 22 and 24 two 60-ton Bucyrus dragline excavators were moved across the Rio Grande river. The bridges for ordinary travel are too narrow and would sustain only about 25 per cent of the weight of these machines. To place them into position for beginning drainage work on the west side of the Mesilla Valley it was necessary to run them on their own caterpillar tractors from the railroad station across the river to the proposed ditch location.

One picture shows the machine excavating a runway to enable it to reach the river bottom. This machine crossed the quicksand in a day and a half, utilizing platforms to distribute the weight and prevent sinking, which would have occurred without the platform arrangement. The second machine crossed the river in a half day.

The gates at the Elephant Butte dam were closed and although it was impossible completely to dry the river bed, the water was diminshed to such



LEFT—DRAGLINE EXCAVATOR CUTTING RUNWAY THROUGH EMBANKMENT OF RIVER. RIGHT—MACHINE IN THE BED OF THE STREAM HANDLING PLATFORMS TO DISTRIBUTE THE WEIGHT AND PREVENT SINKING.

a small quantity as to interfere little with the crossing. J. L. Burkholder, engineer in charge of drainage, supervised the arrangements for the crossing.

Interstate Secures Lawson Tramway.

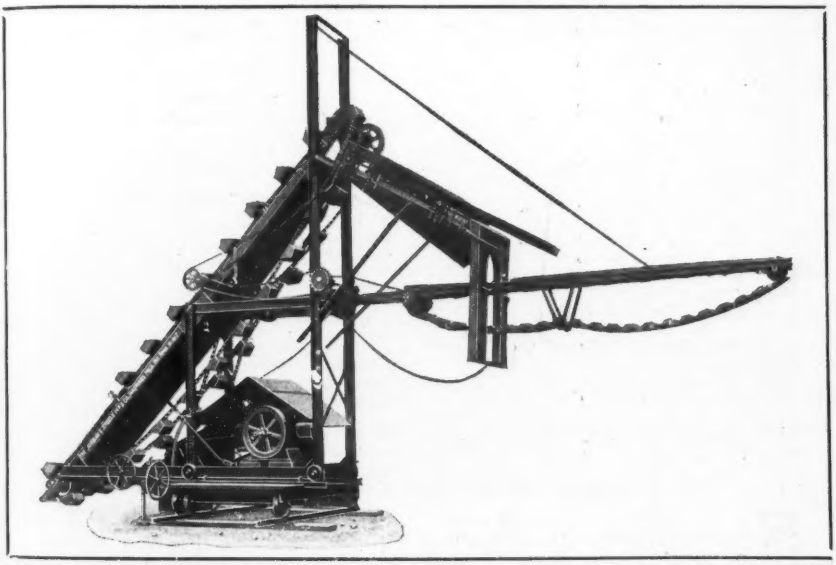
The interstate Equipment Corporation announces the removal of its offices to 10 Wall street, New York, N. Y. This company has recently taken over the manufacture of the Lawson automatic tramway which is especially designed for transporting materials in bulk, such as coal, ore, sand, gravel, clay, cement, etc. The shops of the Interstate corporation at Roanoke, Va., are prepared to make prompt shipment of all the standard lines of equipment.

Gravel Screener and Loader.

Pictured here is the Michigan, Jr., gravel screener and loader for taking gravel out of the pit or pile, screening out the sand and stones and loading it into wagons in one operation. The machine runs alongside the pit or pile of material on a track and removes a slice of material about four feet wide at each setting. After it has traveled the length of the track, the rails are moved over and the loader again performs the operations just described.

It is self-contained, furnishes its own power and has an attachment on the screen that prevents it from clogging up with clay, hard lumps or other foreign materials. The screened gravel is delivered near the machine and the sand and stone are taken a distance of 20 feet so as not to necessitate their being moved. The screener and loader is particularly adapted to the requirements of road commissioners, township boards and road-building contractors and in road-building jobs where the removal of quantities of dirty material is necessary in order to perform first-class work or pass the state inspection. It is manufactured by the Jordan & Steele Mfg. Co., Hastings, Mich.

George B. Massey, head of George B. Massey & Co., excavating engineers of Chicago, has found the call of patriotism too strong to resist. Indeed, at the beginning of the time when it was learned that the United States would be compelled to draw the sword for the preservation of democracy, Mr. Massey enlisted in the navy. For five months he has been stationed on the training ship Isla du Luzon at the Great Lakes Naval Training Station near Chicago, and has won a lieu-



MACHINE WHICH TAKES GRAVEL OUT OF THE PIT OR PILE, SCREENS OUT THE SAND AND STONE, AND LOADS IT INTO WAGONS IN ONE OPERATION.

We Are the Pioneer Manufacturers of Gravel Washing Machinery

The first gravel washing plant was an "S-A" Plant. We developed the original gravel washing machinery which is still recognized as standard. In fact, the records will show that we actually developed the industry.

Altogether in the past fourteen years we have designed and equipped about 400 gravel washing plants. Each one of these was especially designed—each one has been a *commercial success*. We have turned down orders for a number of plants where the elements of success where lacking. We have turned failure into success for several others by re-equipping with "S-A" Machinery.

We have a strong organization of engineers—and a large plant devoted to the manufacture of the highest grade of conveying elevating, screening and transmission machinery.

It is to your interest to deal with manufacturers and not jobbers

"Ask the Man Who Owns One"

The following is an incomplete list of the newer "S-A" plants

Gravel Washing

Los Angeles Rock & Gravel Co.
Scottsville Sand & Gravel Co.
Montana Concrete Co.
Vandalia Railroad.
Standard Builders' Supply Co.
Hawarden Sand & Gravel Co.
H. D. Conkey Sand & Gravel Co.
F. A. Downs Construction Co.
Mason City Sand & Gravel Co.
Jensen & Jensen.
Virginia Sand & Gravel Co.
L. D. Burd.
Wabee Gravel Co.
Summit Sand & Gravel Co.
Geo. J. Hoffman.
Logansport Gravel Co.
Battjes Fuel & Supply Co.
Wabash Sand & Gravel Co.
Macksville Gravel Co.
Mason City Sand & Gravel Co.
Covington Sand & Gravel Co.
American Agricultural Chemical Co.
Madison Construction Co.
Windsor Sand & Gravel Co.
Atwood Davis Sand Co.
Lake County Gravel Co.
Chas. Vivian.
Vigo Washed Sand & Gravel Co.
Interstate Material Co.
H. W. Hawly.
Wabash Sand & Gravel Co.
Kingsley & Pagant.
Pueblo Bridge.
Minden Gravel Co.
C. H. Billings.
Canada Sand & Gravel Co.
C. H. Little & Co.
Beaver Sand Co.
McCraney Sand Co.
Coon River Sand Co.
Downs Construction Co.
Virginia Sand & Gravel Co.
Chicago Gravel Co.
Hoyt Mining Co.

Stone Washing

Brownell Improvement Co.
Peoples Crushed Stone Co.
U. S. Crushed Stone Co.
Big Rock Stone & Const. Co.

"S-A" Equipped Crushing Plants

A. C. Laughlin Stone Co.
France Stone Co.
General Crushed Stone Co.
National Lime & Stone Co.
Bessemer Limestone Co.
Branchton Limestone Co.
Blair Limestone Co.
Standard Lime & Stone Co.
Union Lime Co.
Elmhurst & Chicago Stone Co.
Leathem & Smith.
Greenleaf Stone Co.

We'll gladly supply the address of any of the above for reference or send names of "S-A" plants in your territory

Put your proposition up to us and we'll help you make it pay

Stephens-Adamson Mfg. Co.

Aurora, Ill.

tenantcy by his hard work and enthusiasm. He is a veteran of the Spanish-American War, through which he served as an ensign. Mr. Massey was with the Bucyrus company in Milwaukee for several years, but has managed his own company for nearly three years.

Aerothrust Pumping Unit.

A beginner might not appreciate the saving of an up-to-date pumping outfit, while some contractors like to make a job last and run into money when they are getting a percentage; but the contractor who has his own interests at heart, however, is keen to get the job done right and just as quickly as possible at the least expense. To such a contractor the Aerothrust Pumping Unit, made by the Aerothrust Engine Co., 500 Madison street, La Porte, Ind., is a valuable piece of equipment, as it will pump about 125 gallons a minute from a depth of 30 feet and keep it up all day long. The outfit weighs only 150 pounds, so that two men can easily carry it from place to place.

Tramway Carries Sand Two and One-Half Miles

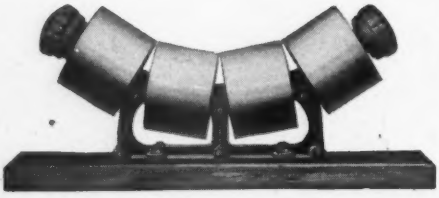
FOR SAWING MARBLE tons of sand of a certain quality are used in the mills at Proctor, West Rutland and Center Rutland. To transport the sand from the pit at Pittsford two and a half miles over meadows and wooded hills iron buckets are run on a tramway, one cable being used for the return of the empty buckets and the other for carrying the loads. Formerly the sand so used was shoveled into wagons and hauled by horses. The tramway displaced the horse-drawn wagons, but the buckets were loaded at the pit by hand labor.

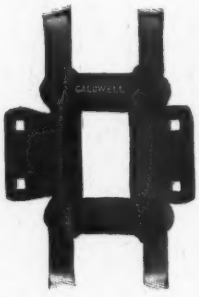
An electric shovel (Thew Automatic, Type O), fitted with wide tires on the wheels or truck, is able to move about the pit and scoop up the sand, dumping it into a small car which is run on a track to a shed where its contents are emptied into a hopper, from which the iron buckets are filled. The shovel is equipped with a 20-h.p. motor furnishing power for scooping up the sand and to propel it from place to place, no trolley being used. One man in one-third of a day, operating the shovel thus equipped, does the work of six men who were formerly employed all day to fill the buckets with sand. At the present time 4,500 tons of sand per month are being handled in this way. This shovel was manufactured by the Thew Automatic Shovel Co. of Lorain, Ohio, and it is operated by the Vermont Marble Company, whose home office is Proctor, Vermont.

CALDWELL MACHINERY

FOR HANDLING

Stone, Gravel, Sand





Screw and Belt Conveyors, Steel Elevator Casings and Buckets, Gears, Cut and Cast Teeth, Link Chain Belting, Shafting, Pulleys, Sprocket Wheels, Etc.

H. W. CALDWELL & SON CO.

CHICAGO

Western Ave., 17th to 18th Sts.

New Silica Plant Has Big Capacity.

(Continued from page 20)

foot of the cup elevator, a quantity of very fine material is recovered by placing a portable bin on the floor. This material, which is really dust off the belt, is sold as banding sand.

Screens and Storage Bins

At the top of the cup elevator the sand is delivered to two sets of inclined bumper screens in troughs 4 inches deep and 25 feet long, each containing four screens of various mesh. These screens lead downward at a sharp angle from the vertical cup elevator, and the product of each is chuted into bins, according to size, there being six bins to hold three sizes. These bins hold 100 tons each and load through steel spouts directly to the cars, stationed on a Fairbanks scale, which have previously been lined with paper.

Two 35 h. p. General Electric alternating current motors are required to operate the plant, one of them being for the handling of wet materials and the other for the drying department.

Grades of Sand Produced

The following grades are produced: Federal fine, banding, 20-30 standard sand for testing cement, sand blast, sawing, glass and regular run. Provision is also made for shipping wet sand in gondolas. Shipments are made over the C. R. I & P. and the C. B. & Q. railways.

The company is officered by E. B. Thornton, president; J. B. Herring, secretary and treasurer, and C. B. Herring, manager. Both plants are under the superintendency of J. Gyger. Wayne B. Gyger, his son, is assistant superintendent and is in charge of Mill B. To the latter Mr. Gyger we are indebted for much of the information on which this description is based.

Pulverizing Plant in Mill A

One of the interesting features of the older plant of the Ottawa Silica Company is the silica pulverizing department, whose product is extensively used in the manufacture of paints and enamels. The material is taken from the drying bins and passed through two Jeffrey tube mills 24 feet long and 5 feet in diameter. In these mills the material is crushed by falling pebbles to the following proportions: 98 per cent passing a 200-mesh screen, 94 per cent passing a 100-mesh screen, and 95 per cent passing a 140-mesh screen.

A conveyor belt 12 inches wide and 75 feet long delivers the material from the drying bins to the tube mills through a hopper with two spouts, one leading to each tube mill. After the crushed silica leaves the tube mills it is elevated by a cup elevator to three bins, 75 feet above, holding 100 tons each. The product is shipped in 94-pound sacks, either burlap or paper. The plant has a capacity of about two carloads a day.

An interesting feature of the pulverizing plant is the Allis-Chalmers dust collecting system. Because of the flour-like fineness of the product, there previously had been much trouble and discomfort caused by flying dust and considerable time and effort were spent in the solving of the dust-collecting problem. The system now installed gives complete satisfaction, in general comprising an American Blower Company fan No. 80 operated by a 7 h. p. General Electric Company motor and a four-pocket suction bag compartment containing 48 bags in all.

There has just been issued a handy little booklet which contains a list of all the products manufactured by the E. I. du Pont de Nemours and associated companies, namely, Du Pont Chemical Works, Du Pont Fabrikoid Company, the Arlington Company and Harrisons, Inc. Of course, this booklet does not indicate who uses the products or how used, as does the Du Pont Products Book

Digging Deep For Its Load

Filled—and then some—at every grab—the "Blaw" Bucket works *far in excess of its rated capacity.*

"Blaw" Buckets

are tremendous cost cutters in any material where a bucket can be used. Added to the economy secured by its speed in digging and handling materials, there is *the big saving due to low maintenance cost.*

In stock, for prompt shipment, are "Blaw" Buckets for every need of the contractor.

Write for the "Blaw" Bucket Book

Blaw-Knox Company

605 Farmers Bank Building
PITTSBURGH, PA.

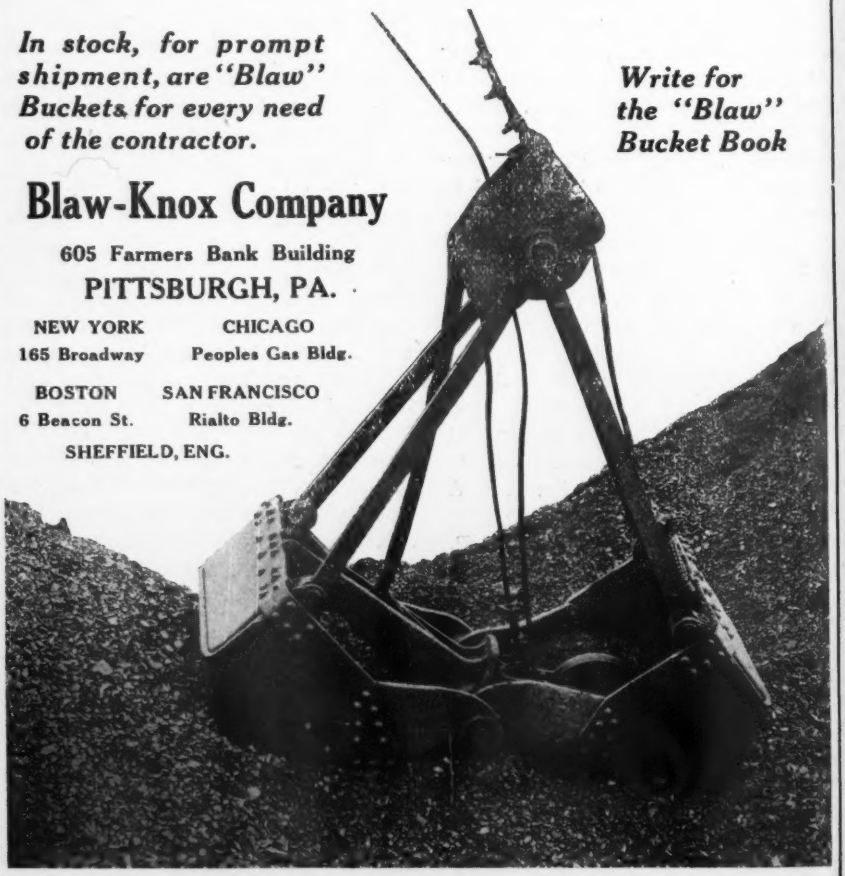
NEW YORK
165 Broadway

CHICAGO
Peoples Gas Bldg.

BOSTON
6 Beacon St.

SAN FRANCISCO
Rialto Bldg.

SHEFFIELD, ENG.



Air Compressors and Their Uses

The first of a series of practical articles describing such operations as have been manifestly benefited by the cutting down of labor costs, the increase of production, the solving of difficult operating conditions, or in any manner in which improvement has been made.

AIR COMPRESSORS have become a very necessary part of many quarrying and sand pumping operations, to which they are particularly adapted because of their simple and durable construction and the ease with which they may be moved from one position to another. Though frequently subjected to severe usage and openly exposed to the weather, yet they rarely fail to give the full measure of service and at a comparatively low operating expense.

In this and future issues of Pit and Quarry it will be our aim to set forth various practical uses of air compressors, first dealing with the general construction features of the machines themselves. Their purpose is to put power into proper form for convenient and economical transmission—convenient because they can be stationed adjacent to or at great distances from the working point, and economical for the reason that their first cost, installation and maintenance charges are relatively low in respect to the service given.

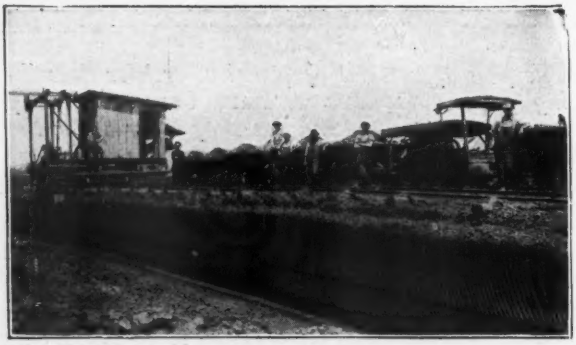
Manufacturers of air compressors have perfected their designs so that practically 100 per cent efficiency is obtained. The tendency of air to rise in temperature when compressed has been met by cooling arrangements at the place of compression, though when traveling great distances the air is sometimes admitted to the pipes without being previously cooled, losing some of its heat in transit. Loss of heat en route means decrease in pressure, however, so that the latter method does not make for complete efficiency. A cubic foot of "free" air at normal atmospheric pressure of 14.7 pounds per square inch and 60° F. will have a temperature of 225° F. and pressure of 2.64 atmospheres when compressed to one-half its original volume. This condition (with no heat removed) is "adiabatic" compression; when the heat is taken up by a cooling arrangement as fast as generated the compression is "isothermal."

Two Classes of Compressors.

There are two general classes of air compressors: (1) the straight line, so called because the steam and air cylinders are arranged in a straight line and the power is applied through a single long piston rod connecting all pistons; and (2) the duplex, with two compressors set side by side, each made up of a steam and an air cylinder connected to a crank shaft carrying a single balance wheel.

Steam and power driven compressors comprise the second class. The steam cylinder is an integral part of the former, but the latter is propelled by outside power transmitted by belts, ropes, chains, gears or a direct shaft connection, the belt-driven type being the most common. The direct shaft is used only with electric motors or water wheels.

Compressors have two general



The Plymouth Hauling Clay for the Claycraft Brick Co.

"Cheaper in Clay Pit Than Horses" —*Says M. J. Kaufman*

It costs the Claycraft Brick Co., of Columbus, O., less than half to haul clay with a Plymouth-drive Gasoline Locomotive than with horses, besides adding six more cars and keeping the digger and pit men busy.

The Plymouth
Friction-Drive Gasoline Locomotive
Cuts Haulage Costs One Half

The Friction-drive, Continental Motor, Hyatt Bearings, and Heavy Frame—simplest and best of construction, is The Plymouth's secret. No expensive gears—lubrication eliminated—repairs nil. A day-laborer and 5 gallons gasoline run it 10 hours. It takes higher grades, outpulls all locomotives and costs half or one-third less to buy.

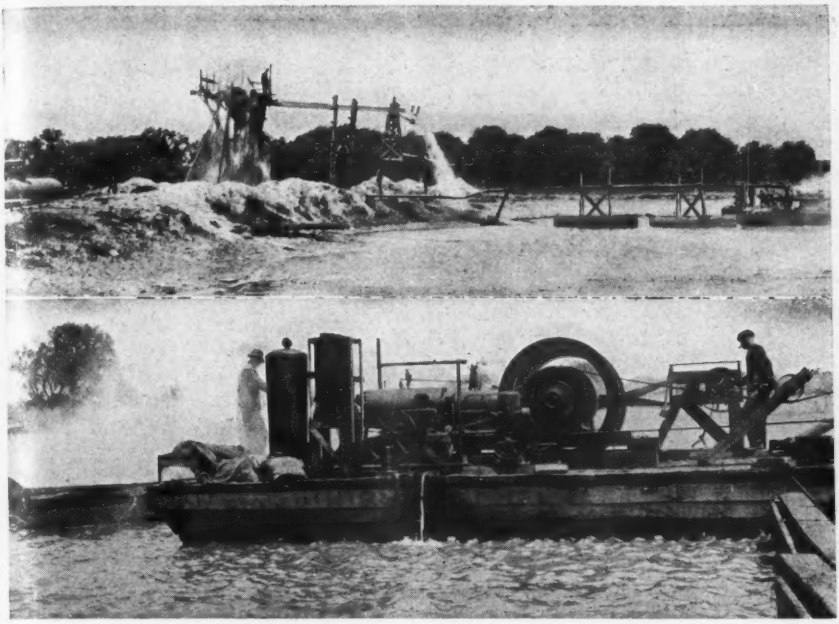
Kaufman Proves This:

"Six horses cost us $2.25 daily to feed, and three drivers $1 a day each, making $5.25 daily," says M. J. Kaufman of the Claycraft Brick Co. "The Plymouth costs us 67c for gasoline, 5c for oil and $1.50 for the operator. Our saving of 20 cents per thousand brick paid for the locomotive and cars in one short season."

Book Tells: It describes this and other installations; and gives cost data regarding haulage problems similar to your own. Send for it.

THE J. D. FATE CO.

206 Riggs Ave., PLYMOUTH, O.



ABOVE — SCOW-MOUNTED AIR COMPRESSOR PUMPS SAND FROM THE BOTTOM OF THE RIVER TO A HEAD-FRAME ON THE SHORE, WHERE IT IS SCREENED. BELOW—CLOSE-UP VIEW OF THE COMPRESSOR, A 50 H. P. FUEL OIL ENGINE WHICH OPERATES THE ROTARY SAND PUMP.

shapes, vertical and horizontal. The vertical type is particularly adapted to limited space and is usually power driven. The horizontal type is more extensively adopted, many of which are portable. Compressors are also classified as single stage or double stage, having to do with the degree of compression.

The illustrations show the sand pumping plant of the Platte Gravel Company at Cedar Creek, Neb., on the Platte river. A 50 h. p. fuel oil engine operates a rotary sand pump, both of which are mounted upon a scow. A suction pipe leads from the sand pump to the bottom of the river, where the sand is picked up and carried up through the pump and through a pipe line to the bank of the river, from whence it is carried to the top of a head-frame where the sand, gravel and water are thrown against a screen.

The size of the gravel allowed to pass through with the sand is determined by the size of the screen mesh. Having passed through the screen, the sand is promptly loaded into railroad cars, the water returning to the river.

The outfit is in operation on an average of fourteen hours per day, is looked after by workmen having no engineering experience and no repairs have been required. It is the "Giant," manufactured by the Chicago Pneumatic Tool Co., Chicago, Ill.

A More Representative Title

The change in name from Cement Machinery and Building Equipment Show to Contractors' and Builders' Show not only shortens the title but is far more representative of the character of the exhibition. The management is now making extensive preparations which have as their object the holding of an exhibition of even larger scope than was at first planned. All interests concerned are giving hearty and active co-operation.

Government Stops Delivery of Open Cars.

Without previous warning Robert S. Lovett, chairman of the Priority Freight Commission Committee, on Nov. 2 issued Order No. 2 prohibiting the delivery of open-topped cars used for hauling the following:

1—Materials and supplies other than coal for the construction, maintenance or repair of public or private highways, roadways, streets or sidewalks.

2—Materials or supplies other than coal for the construction, maintenance or repair of theaters or other buildings or structures to be used for amusement purposes.

3—Materials or supplies other than coal for the manufacture of pleasure vehicles, furniture or musical instruments.

4—Passenger vehicles, furniture and musical instruments.

The order aims at the immediate stoppage of highway construction in order that the cars may be used for transporting coal, coke, ore, limestone, sugar beets, cane and other raw materials for use in the metal, sugar, fertilizer and other industries of first importance to national sustenance.

No regard whatever was paid to the condition of the industries most affected—sand and gravel and crushed stone. The fact that unfilled contracts amounting to millions of dollars are in existence was ignored. Railroads are permitted to haul coal to whom they see fit, which means that establishments manufacturing unnecessary luxuries will continue to receive thousands of tons of coal which in transporting requires the use of thousands of cars.

ORGANIZATIONS ASK 30-DAY DELAY.

As soon as it could be realized that such an order had really gone into effect, road-building organizations of Ohio, firms supplying equipment in road construction, and sand and gravel and crushed stone producers formed a committee composed of the following members, which appeared in Washington Nov. 5, to seek a 30-day suspension of the order so that some of the more urgent contracts could be filled:

W. A. Alsdorf, the Ohio Good Roads Federation; A. P. Sandles, secretary of the Ohio Macadam Association; L. H. Hawblitz, president of the Ohio Macadam Association; Charles C. Marshall, Public Utilities Commission of Ohio; James B. Dugan, Public Utilities Commission; Clinton Cowen, State Highway Commission; A. H. Hinkle, also of the State Highway Commission; W. P. Blair, National Paving Brick Association; J. G. Barbour, Metropolitan Brick Co.; Raymond Beck, B. F. Goodrich Co.; Royal Scott, Willys-Overland Co.; A. R. Taylor, president of the Ohio Engineering Society; S. M. Williams, Garford Motor Truck Co.; and R. H. Hughes, Portland Cement Association.

The committee expressed the desire of the industries it represented to cooperate with the Government to the fullest extent. It sought the aid of Mr. Hoover, chief of the Food Bureau, pointing out that immediate cessation of road construction would leave many highways unfinished and seriously affect the delivery of food stuffs to and from the railroads and markets. In addition to the efforts of the committee the various state associations sent telegrams and letters to Chairman Lovett, pointing out the serious economic damage done to the country by immediately stopping road work. Many individual firms also sent personal letters stating their situation.

No action has been taken with regard to the modification of the ruling as yet by the Priority committee, and it is feared that big losses are in prospect for the sand and gravel and crushed stone industries and those using these materials if sufficient time is not allowed in which to ship such materials as is necessary to complete unfinished contracts.